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A MAGNETIC HEDDO  
[Jiki Heddo]

Noriyuki Tanemura, et al

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INVENTOR (72) : NORIYUKI TANEMURA,  
                  YOSHIKAZU FUKUHARA,  
                  NOBUAKI KANEKO  
APPLICANT (71) : KYANON DENSHI, INC.  
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## 1. Title of the Invention

A MAGNETIC HEAD

## 2. Claims

1) The magnetic head which is characterized by the fact that in a magnetic head which is equipped with a coil which has been attached to a magnetic core and wound around the coil and a circuit board which possesses an electric conductor pattern to which is connected the terminal of the coil of this coil bobbin, an extension part is installed on one tip of the above-mentioned coil bobbin and a projecting part for the purpose of fixing the terminal of the coil is installed on this extension part.

2) The magnetic head recorded in Claim 1 which is characterized by the fact that an opening part to which is linked the projecting part for positioning which is provided in a protruding condition on the extension part of the coil bobbin is installed on the circuit board side.

## 3. Detailed Explantion of the Invention

[Field of Industrial Application]

The present invention concerns a magnetic head, and more specifically concerns a magnetic head with a structure which possesses a coil bobbin which has been attached so as to fit a

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\*Numbers in the margin indicate pagination in the foreign text.

magnetic core and in which an electrical circuit of the coil which has been wound around the coil bobbin is connected electrically to the circuit terminal.

[Overview of the Disclosure]

This specification and the figures disclose a technique whereby accurate positioning is possible for the terminal of a coil and the connection terminal of the electrical conductor pattern merely by linking the coil bobbin to the circuit board side by means of the installation of an extension part on one tip of the above-mentioned coil bobbin and of a projecting part for the purpose of fixing the terminal of the coil on this extension part in a magnetic head which is equipped with a coil which has been attached to a magnetic core and wound around the coil and a circuit board which possesses an electric conductor pattern to which is connected the terminal of the coil of this coil bobbin.

[Prior Art]

Previous kinds of magnetic heads like this were employed in magnetic disk devices which carry out the recording and replay of information on magnetic disks.

The prior structure of magnetic heads with this kind of structure is shown in Figs. 10 to 12.

The example shown in Figs. 10 to 12 ... [Translator's note: line missing from the original] recording and replay head...  
[Translator's note: line missing] head, the item indicated

by G1 in the key is the record-replay gap, and the item indicated by G2 is the erase gap.

The record-replay head is composed from the first to the third cores (11 - 13) which are composed of a highly transparent magnetic material.

The first core (11) has a coil bobbin (15) like that shown in Fig. 11 mated with it.

The coil bobbin (15) possesses a cylindrical part (15a) which has been mated to the first core (11) and flanges (15b) which has been monobloc molded to both ends of the former, and a through hole (15b) for the purpose of mating the first core (11) including these flanges (15b) has been created.

A coil (14) has been wound around the [illegible] (15a) of the coil bobbin (15).

In addition, the second coil (12) is opposed to the first core (11) though the medium of the record-replay gap (G1), and these are linked to form one unit.

Both of the tip parts of the third core (13) are fixed on the rear tip part of the first core and the second core (11, 12), and both cores... [Translator note's: line missing] ...

On the other hand, the erase head (2) possesses the first to the third cores (21 - 23), a coil bobbin (25) with a coil (24) wound around it has been mated to the first core (21), the second core (22) is linked to the first core (21) through the medium of

the erase gap (G2), and the third core (23) has been fixed on the rear tip part of the first and second core (21, 22).

Then, it is configured such that the record-replay head (1) and the erase head (2) are linked by opposing the respective cores (12, 22) by the interposition of a spacing plate (3) which is composed of a non-magnetic material, and the record-replay gap (G1) and the erase gap (G2) are provided in neighboring contact by the interposition of the spacing plate (3) and the respective cores (12, 22) of the heads.

On the other hand, the item indicated by (5) in the key is the circuit board, and an electrical conductor pattern (4) has been created on it.

Then, the terminals (14a, 24a) of the above-mentioned coils (14, 24) have been linked electrically by soldering to the terminal parts (4a) of the electrical conductor pattern (4), and the electrical signals of the respective coils are drawn out to the external circuit through the medium of the connection part (2).

Figure 12 explains the magnetic head as a whole. In Fig. 12 the item indicated by (6) in the key is an elastic plate, and it possesses opening parts (6a, 6b) in roughly the shape of the Japanese kana " " large and/or small which have been positioned by opposing these, on the part which is held between by these opening parts (6a, 6b) the coil bobbins (15, 25) are fixed to the

elastic plate through the medium of a slide (7), and are fixed to the elastic plate of the circuit board (5).

Recording and replay and erasing for the magnetic disk was carried out by employing a magnetic head with a structure such as described above.

[Problems which the Invention Attempts to Solve]

However, when the structure described above is adopted, it is necessary to carry out positioning by [sic.] the terminals (14a, 24a) of the coils on the terminal part (4a) and attaching these firmly for the purpose of soldering the terminals (14a, 24a) of the coils to the terminal part (4a) of the electrical conductor pattern (4) on the circuit board (5).

However, the diameter of the terminals (14a, 24a) of the coil ordinarily is a lead of the [illegible] of 0.02 mm to 0.05 mm, and thus there is the problem that they are hard to grip and easily broken when positioning is carried out by gripping with tweezers, etc.

In addition, three simultaneous operations are required, the fixing of the terminals (14a, 24a) of the coils, the positioning of the soldering iron, and the supply of solder, at the time of the soldering operation, and thus there is the problem that many man-hours are involved in addition to the fact that extreme heat tempering is required.

Moreover, after the soldering is completed the post-treatment processes for the cutting of the excess terminal part in order to prevent the terminals (14a, 24a) of the coil from shorting out have also been numerous.

For this reason a connection method involving non-contact type coil terminals which employ a laser beam, etc. In order to try eliminate the excessive operational man-hours described above and to make the process automatic has been proposed.

However, since the terminals (14a, 24a) of the coil are the lead of the [illegible] and moreover the position of these terminals is not regulated, so it is extremely difficult to grip automatically the terminals (14a, 24a) of the coil, to position and to attach tightly these on the circuit terminal part (4a), and to connect them automatically by means of a laser beam, etc.

#### [Means for Solving the Problem]

... [Translator's note: lines missing] employed a structure /67 in which an extension part is installed on one tip of the above-mentioned coil bobbin and a projecting part for the purpose of fixing the terminal of the coil is installed on this extension part in a magnetic head which is equipped with a circuit board which possesses an electric conductor pattern to which is connected the terminal... [Translator's note: lines missing]

[Action]

When the above-described structure is adopted, it is possible to conduct the connection operation for the terminal of the coil easily by linking the extension part of the coil bobbin to the circuit board side.

[Working Examples]

Below, an explanation of the details of the present invention is provided based on the working examples shown in the figures.

Moreover, in the several working examples discussed below the explanation has been abbreviated by the application of the same key to those parts which are identical or equivalent to the prior structure.

[Working Example 1]

Figures 1 to 5 are... [Translator's note: lines missing] explain the first working example of the present invention.  
...[Translator's note: lines missing]

As described below, a window part (16a) in order to make possible the connection operation by a means (for example, a soldering iron, a laser beam, or an ultrasonic oscillator) which connects the terminals (14a) of the coil to this extension part (16) has been created.

In addition, two protrusions (16b) for positioning on the extension part (16) have been provided in a protruding manner in

the position which approaches the coil bobbin (15) from the window part (16a), and opposing these protrusions (16b) a protrusion (16c) which winds around the terminals (14a) of the coil and conducts positioning has been provided in a protruding manner on the side [illegible] of the extension part (16a) [sic; should be "16"] which is on the opposite side from the protrusions (16b) which sandwich the window part (16a).

Then, as shown in Fig. 1 the terminals (14a) of the coil are drawn out onto the extension part (16), then conducted along the inner side of the projections (16b, 16b), and then fixed by traversing the window part (16a) and being wound around the protrusion (16c).

By this means, the terminals (14a) of the two coils are positioned in the prescribed position.

On the other hand, on the side [illegible] of one side of the extension part (16) a protruding part (16d) for the purpose of positioning the coil bobbin towards the circuit board has been created facing the same direction as the protrusions (16b) and moreover along the extension part (16a) [sic; should be "16"] in a long and slender fashion.

On the other hand, as shown in Fig. 3, the position relationship between the circuit board (5) and the extension part (16) of the coil bobbin is shown.

In Fig. 3, the distance between the inner side wall of the protruding part (16d) and the terminals (14a) of the coil on one side is set at P11, and the distance between the terminals (14a, 14a) is set at P21, and the distances between the edge (5a) of the circuit board (5) and the direct [illegible] which passes through the center of the group of terminal parts which are located in the position of the terminal parts (4a) of the electrical conductor pattern (4) and the position which approaches the side on one side are respectively P12 and P22.

Then, it is configured such that  $P11 = P12$ , and  $P21 = P22$ .

Moreover, the spacer which has been installed on the reverse surface of the end part of the circuit board (5) is a component used for the intermittent adjustment of the space between the elastic plate (6) and the extension part (16) of the flange of the coil bobbin (15).

Next, an explanation of the connection method which employs the coil bobbin with the structure described above is provided together with Fig. 4.

First, as shown in Fig. 4, the coil bobbin is positioned such that the electrical conductor pattern (4) of the circuit board (5) is the upper side and the protrusion (16d) of the extension part (16) is the lower side, and the inner side edge of the protrusion part (16d) is connected to the side edge (5a) of the circuit board (5).

When this is done, since the terminals (14a, 14b) of the coil and the terminal part (4a) of the electrical conductor pattern (4) are in a positional relationship like that described above, the terminals (14a) overlap with each other accurately in conformity with the center of the terminal part (4a).

In this state, connection of the terminals (14a) of the coil and the electrical conductor pattern is carried out by irradiating the connection part (4b) by passing a laser beam (9a) through the medium of for instance a condensing lens (9) through the window part (16a).

Moreover, in Fig. 4, it is acceptable to determine the positioning in the front and rear direction based on the position at which the edge of the circuit board (5) is connected with the protrusion (16c) or the position at which the edge of the circuit board (5) is connected with the coil (14).

The operation for the mating of the core of ...[Translator's note: lines missing] to the coil bobbin and the fixing of the coil bobbin and the circuit board to the elastic plate is extremely easy.

Moreover, in the working example described above only the coil bobbin of the magnetic heads on one side have been shown in the example, but it is acceptable to make the coil bobbin of the magnetic heads on the other side into a completely identical structure.

Since in this manner a structure in which a protrusion used for regulation of the position of the terminals of the coil has been installed on the side of the extension part (16) and a protruding part which carries out regulation of the position of the space between the side of the circuit board and the extension part has been provided in a protruding manner on the [illegible] of the extension part has been employed, it is possible to position accurately the terminals of the coil and the electrical conductor pattern, and moreover to automate the connection between these two, and at the same time no post-treatment is required so there is no generation of mistaken connections or shorts.

Moreover, the above-described structure employs coil bobbins not limited to the multiple magnetic heads, and the coil wound around this ...[Translator's note: lines missing]

[Working Example 2]

Figure 6 explains the second working example of the present invention. In the present working example, a protruding part (16e) used for positioning is installed on one part of the extension part (16), and an opening part (5b) used for positioning which is mated with the protruding part (16e) including the spacer (8) on the side of the circuit board (5) has been created.

When this protruding part (16e) has been mated into the opening part (5b), it is possible to carry out accurate positioning only by linking the extension part (16) and the side of the circuit board (5) provided that one determines the dimensions of each part such that the terminal part (4a) and the terminals (14a) of the coil overlap accurately through the electrical conductor pattern (4).

An effect which is identical to that of the previously described working example is obtained even if this kind of structure is employed.

Figure 7 explains the third working example of the present invention.

In this working example the window part (16a) is made into a notch part and on tip of this is freed. The other parts are identical with those in the first working example, and an effect which is identical to that of the first working example is obtained.

Figure 8 explains the fourth working example of the present invention. In this working example the extension part is in a roughly "H" shape since the window part has been made by the installation of a notch part (16f) on the left and right of the extension part (16).

An effect which is identical to that of the previously described working example is obtained even if this kind of

structure is employed.

Figure 9 explains the fifth working example of the present invention. In this working example a cavity part (16g) has been created on the lower side of the protrusion (16b) in order that it can be configured in to form the same plane as the extension part (16) without providing in a protruding manner from the extension part a protrusion (16b) which is provided in a protruding manner on the extension part (16).

In addition, on the side [illegible] of the side which is opposite the coil bobbin of the extension part (16) a notch (16h) in the shape of a "V" used for positioning has been created opposed to the protrusion (16b).

An effect which is identical to that of the previously described working example is obtained even if this kind of structure is employed.

Moreover, in the above-mentioned working examples only examples in which the bobbin and the extension part have been monobloc molded are shown, but the present invention is not limited to this, and thus it can be applied to cases in which items which have been molded as separate bodies have been integrated by mating or linking.

#### [Effects]

Based on the present invention such as has been made clear by the explanation above, since it employs a structure in which

an extension part has been installed on one tip of the coil bobbin of the magnetic head which is equipped with (a) a magnetic core which has been wound around a magnetic core and which has a coil bobbin attached to it, and (b) a circuit board which connects the terminals of the coil, and a protruding part which fixes the terminals of the coil has been installed on this extension part, it is possible to conduct reliably the treatment of the terminals of the coil and at the same time it is possible to facilitate the connection operation of the coil terminals and it is possible to a magnetic head which is inexpensive and possesses a high degree of reliability.

[Brief Explanation of the Figures]

Figures 1 to 5 explain the first working example of the present invention. Figure 1 is an oblique view diagram of the coil bobbin in a state in which a coil is attached. Figure 2 is an oblique view diagram of the coil bobbin. Figure 3 ... [Translator's note: lines missing] the relationship between the coil bobbin and the circuit board. .... [Translator's note: lines missing] is an oblique view diagram explains the ... [Translator's note: lines missing]. Figure 9 is an oblique view diagram which explains the fifth working example of the present invention. Figures 10 to 12 explain the prior structure. Figure 10 is an oblique view diagram of the main parts. Figure 11 is an oblique view diagram of the coil bobbin. Figure 12 is

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an oblique view diagram of the assembled state of the magnetic head.

[Explanation of the Key]

- 1... Record-replay head
- 2... Erase head
- 4... Electrical conductor pattern
- 4a... Terminal part
- 5... Circuit board
- 5b... Opening part
- 6... Elastic plate
- 14... Coil
  - 14a... Terminal of the coil
- 15... Coil bobbin
- 15b... Flange
- 16... Extension part
- 16a... Window part
- 16b, 16c... Protrusion
- 16d, 16e... Protruding part

[Figure 1] An oblique view diagram of the coil bobbin in a state in which a coil is attached.

14.... Coil  
14a.... Terminal of the coil  
15.... Coil bobbin  
15b.... Flange  
16.... Extension part  
16a.... Window part

[Figure 2] An oblique view diagram of the coil bobbin.

15.... Coil bobbin  
15b.... Flange  
16.... Extension part  
16a.... Window part

[Figure 3] An oblique view diagram which explains the method of positioning.

4.... Electrical conductor pattern  
5.... Circuit board  
5a.... Opening part  
14a.... Terminal of the coil  
16.... Extension part  
16a.... Window part  
16c.... Protrusion  
16d.... Protruding part

[Figure 4] An oblique view diagram which explains the method of connection.

4.... Electrical conductor pattern  
4a.... Terminal part  
4b.... Connection part  
5.... Circuit substrate  
5a.... Opening part  
8.... Spacer  
9.... Condensing lens  
9a.... Laser beam  
14.... Coil  
14a.... Terminal of the coil  
15.... Coil bobbin  
15b.... Flange  
16.... Extension part  
16a.... Window part  
16c.... Protrusion  
16d.... Protruding part

[Figure 5] An oblique view diagram of the assembled state.

4... Electrical conductor pattern  
4b... Connection part  
5... Circuit substrate  
6... Elastic plate  
7... Slide  
14... Coil  
14a... Terminal of the coil  
15... Coil bobbin  
16... Extension part  
21... First core  
23... Third core

[Figure 6] [illegible]

4... Electrical conductor pattern  
4a... Terminal part  
5... Circuit substrate  
5b... Opening part  
8... Spacer  
14... Coil  
14a... Terminal of the coil  
15... Coil bobbin  
15b... Flange  
16... Extension part  
16c... Protrusion  
16e... Protruding part

[Figure 7] An oblique view diagram of the coil bobbin.

15... Coil bobbin  
15b... Flange  
16... Extension part  
16a... Window part  
16b, 16c... Protrusion  
16d, 16e... Protruding part

[Figure 8] An oblique view diagram of the coil bobbin.

15... Coil bobbin  
15b... Flange  
16... Extension part  
16a... Window part  
16b, 16c... Protrusion  
16d, 16e... Protruding part  
16f... Notch

[Figure 9] An oblique view diagram of the coil bobbin.

15... Coil bobbin  
15b... Flange  
16... Extension part

16a... Window part  
16b, 16c... Protrusion  
16d, 16e... Protruding part  
16g... Cavity

[Figure 10] An oblique view diagram of the main parts which explains the prior structure.

1... Record-replay head  
2... Erase head  
3... Spacing plate  
4b... Connection part  
5... Circuit board  
11... First core  
12... Second core  
14... Coil  
15... Coil bobbin  
21... First core  
22... Second core  
23... Third core  
24... Coil  
24a... Terminal  
25... Coil bobbin  
G1... Record-replay gap  
G2... Erase gap

[Figure 11] An oblique view diagram of the coil bobbin of the prior structure.

15... Coil bobbin  
15b... Flange  
15c... Through hole

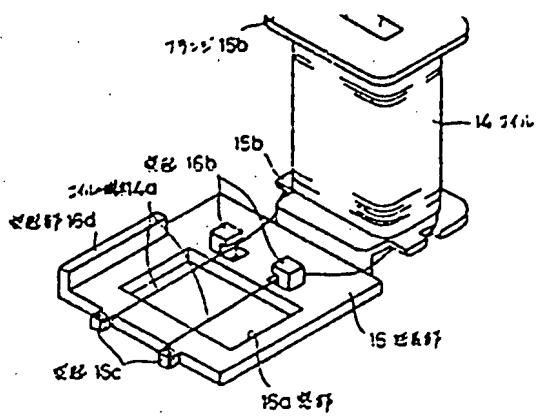
[Figure 12] An oblique view diagram of the assembled state of the magnetic head of the prior structure.

3... Spacing plate  
4a... Terminal part  
4b... Connection part  
5... Circuit board  
6... Elastic plate  
6a... Opening parts  
11... First core  
12... Second core  
13... Third core  
14... Coil  
14a... Terminal of the coil  
15... Coil bobbin  
21... First core  
22... Second core  
23... Third core

24... Coil

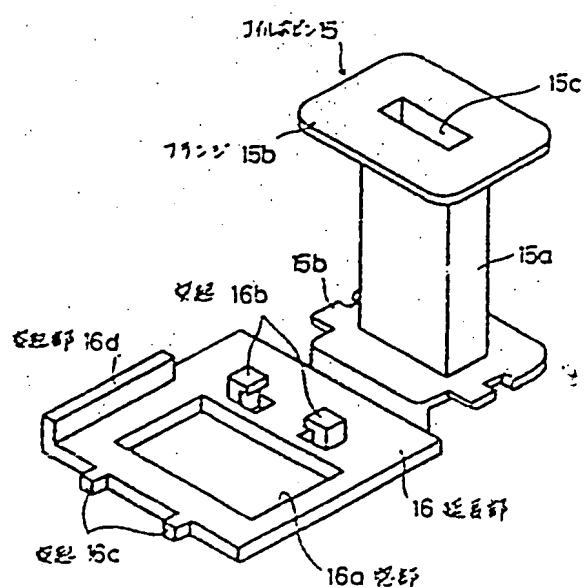
24a... Terminal

25... Coil bobbin



ガルバニゼーション用・ガルバニの時図

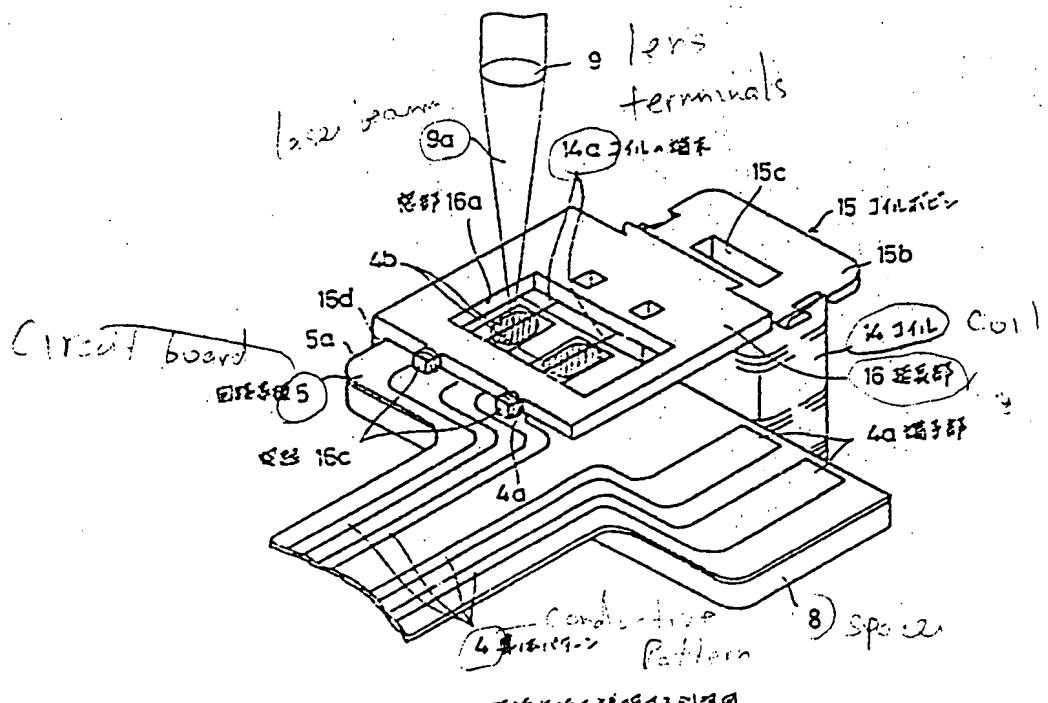
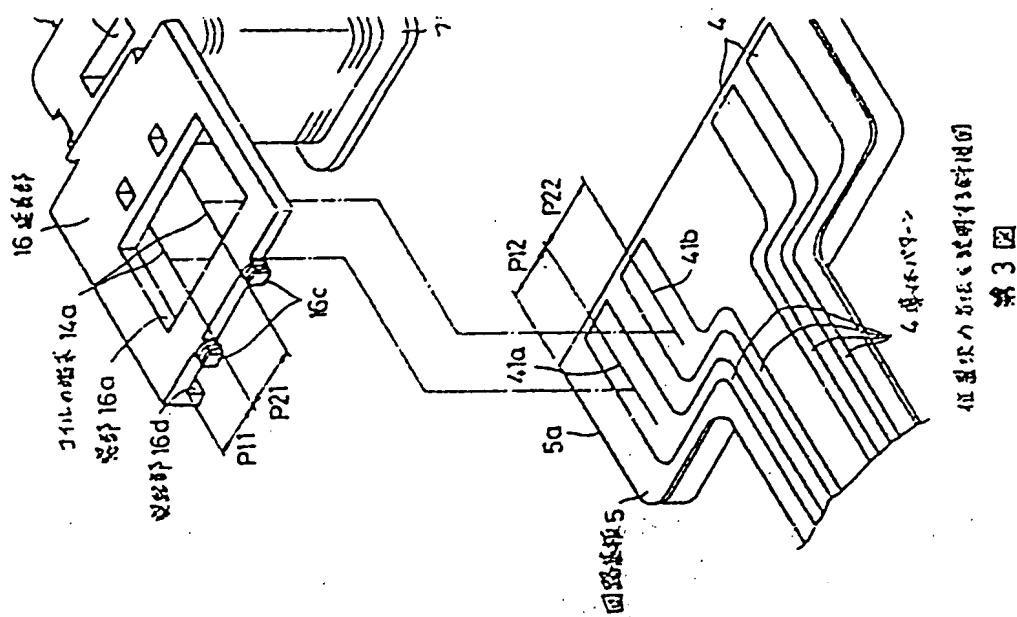
第1図 [Figure 1]



ガルバニの時図

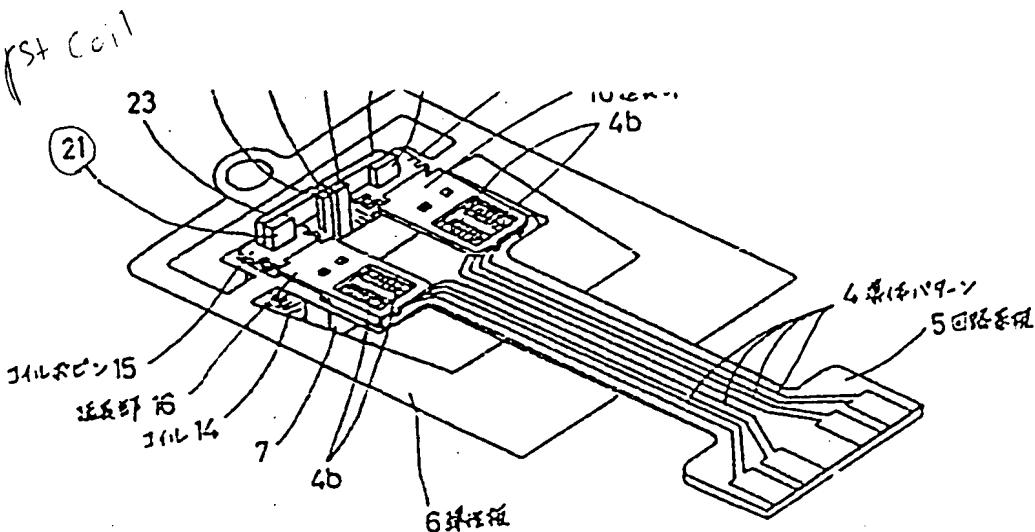
第2図 [Figure 2]

[Figure 3]



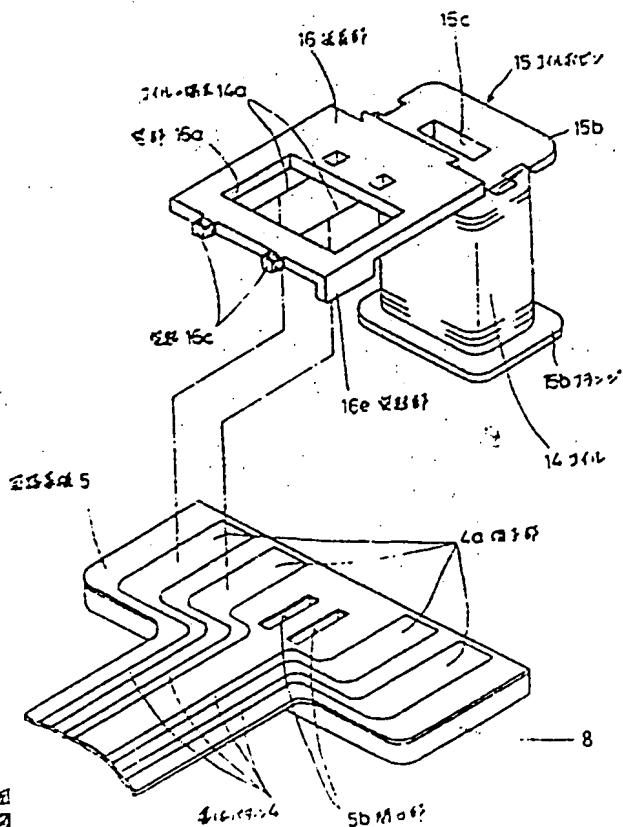
第4図 [Figure 4]

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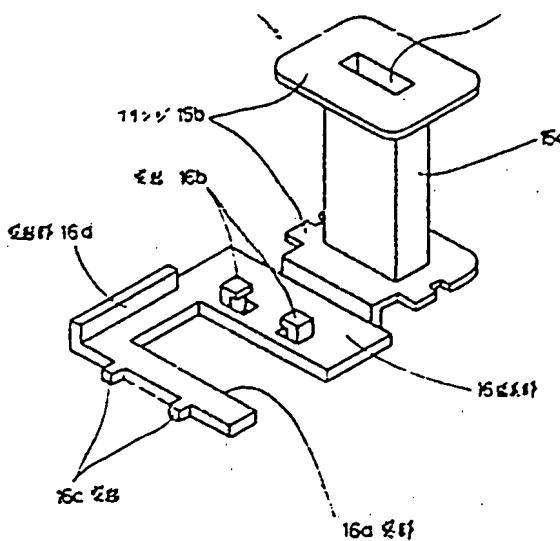


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第5圖 [Figure 5]

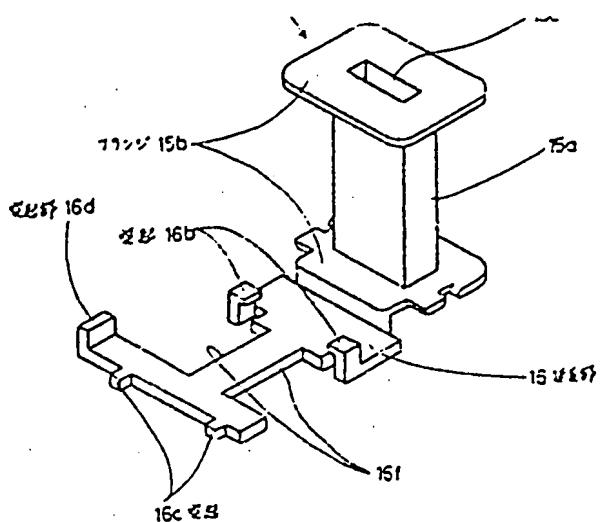


[Figure 6] 



コイルピンの構造図

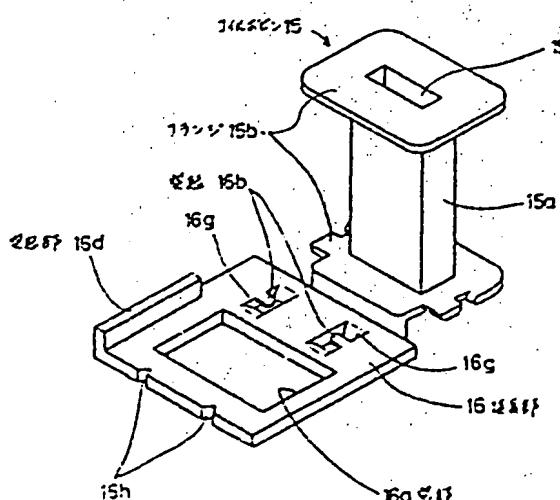
第7図 [Figure 7]



コイルピンの構造図

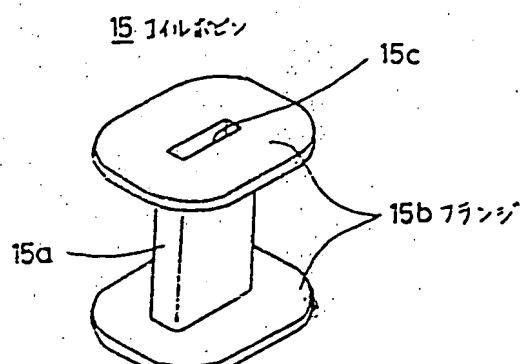
第8図

[Figure 8]



コイルピンの構造図

第9図 [Figure 9]



往來構造のコイルピンの構造図

第11図 [Figure 11]

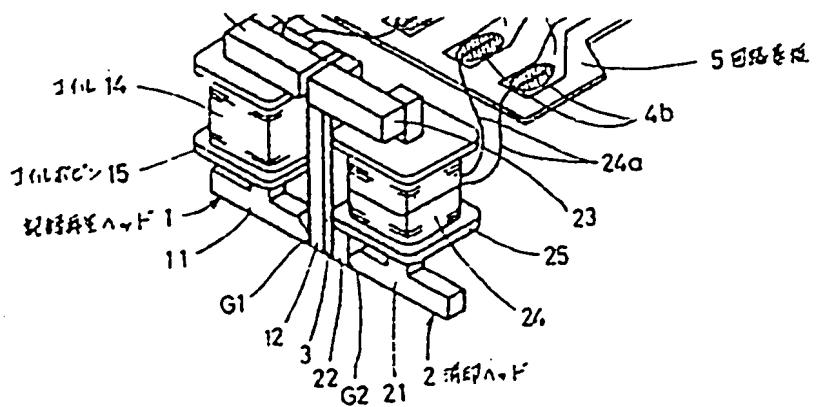


図10 回路基板の組立図

第10図 [Figure 10]

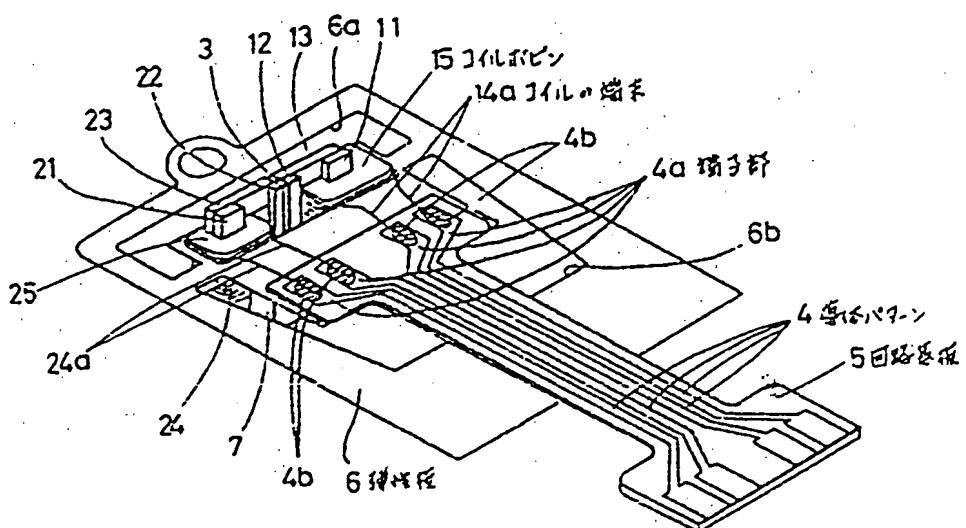


図12 回路基板の組立図

第12図 [Figure 12]